

**Statewide Dual Credit for College Algebra (MATH 1130)  
(Advanced Algebra and Trigonometry #3124)**

**LEARNING OBJECTIVES**

*Dual Credit College Algebra Competencies*

- ☐ *Numeric and Algebraic Operations (23%)*
- ☐ *Describe Equations (5%)*
- ☐ *Solve Equations (23%)*
- ☐ *Solve Inequalities (10%)*
- ☐ *Function and their Properties (32%)*
- ☐ *Representation/modeling (7%)*

**I. Numeric and Algebraic Operations (23%)**

- 1) Factoring and Expanding Polynomials
  - Factor quadratics completely
  - Factor polynomials completely (degree  $\leq 5$ )
  - Determine a binomial expansion
- 2) Operations with Numbers
  - Complex Numbers: Perform basic operations (add, subtract, multiply, divide, conjugate)
- 3) Operations with algebraic expressions
  - Perform basic operations (+, -,  $\times$ ,  $\div$ ) with rational expressions
  - Simplify complex rational expressions
- 4) Operations with exponents
  - Apply the properties of exponents (including rational exponents)
- 5) Operations with logarithms
  - Apply the properties of logarithms

**II. Describe Equations (5%)**

- 1) Write an equation of a line (parallel, perpendicular, point/slope, two points)
- 2) Write an equation of a parabola given vertex and one point.

**III. Solve Equations\* (23%)**

- 1) Solve linear equations.
- 2) Solve application problems involving linear equations (mixture, motion, simple interest, constant rate job)
- 3) Graph linear equations in the Cartesian coordinate system.

- 4) Solve systems of linear equations (two equations with two unknowns)
- 5) Solve quadratic equations that have both real and complex solutions (factoring, quadratic formula, square root method)
- 6) Graph quadratic equations in the Cartesian coordinate system.
- 7) Solve absolute value equations (linear)
- 8) Solve rational equations
- 9) Solve radical equations involving a single square root
- 10) Solve exponential equations
- 11) Solve logarithmic equations

\*One variable unless in Cartesian coordinate system

#### **IV. Solve Inequalities\* (10%)**

- 1) Solve linear inequalities
- 2) Solve application problems involving linear inequalities
- 3) Solve quadratic inequalities
- 4) Solve absolute value inequalities
- 5) Graph linear inequalities in the Cartesian coordinate system.
- 6) Graph systems of linear inequalities in the Cartesian coordinate system (2 inequalities with 2 unknowns)

\* One variable unless in Cartesian coordinate system

#### **V. Function and Their Properties\*\* (32%)**

- 1) Definitions (Each test may contain a variety of functions including linear, polynomial (degree  $\leq 5$ ), rational, absolute value, power, exponential, logarithmic and piecewise- defined)
  - Determine whether a relation is a function from its graph.
  - Evaluate functions for given values.
  - Determine type of functions (linear, quadratic, polynomial greater than 2<sup>nd</sup> degree, rational, exponential, logarithmic, radical, absolute value, piece-wise)
  - Determine domain of a function from equation or graph.
  - Determine range of a function from a graph.
- 2) Graphs and Their Properties (Graphing includes sketch of the graph showing intercepts, symmetry and other important characteristics)
  - Graph polynomial functions of degree greater than 2.
  - Graph exponential functions.
  - Graph logarithmic functions.
  - Graph rational functions (asymptotes – horizontal and vertical)
  - Graph radical functions

- Identify intervals on which functions are increasing, decreasing and constant (from a graph)
- Identify and apply transformations to a graph (horizontal, vertical, reflections, stretching/shrinking)

3) Algebra of Functions and Inverse functions

- Perform basic function operations (add, subtract, multiply, divide)
- Evaluate composition of functions
- Simplify composite functions
- Determine if a given function has an inverse function
- Find the inverse function of a given function if it exists

**VI. Representation/modeling (graphical, numerical, symbolic and verbal) (7%)**

- 1) Solve real world problems involving variation, using both direct and inverse proportionality.
- 2) Solve real world problems involving exponential functions (compound interest, exponential growth and decay).
- 3) Solve real world problems involving logarithms (radioactive decay, decibels, or the Richter scale).